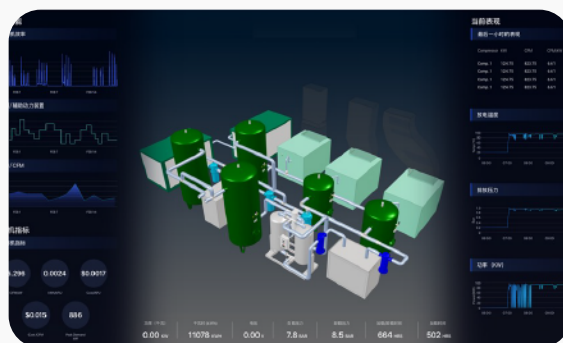
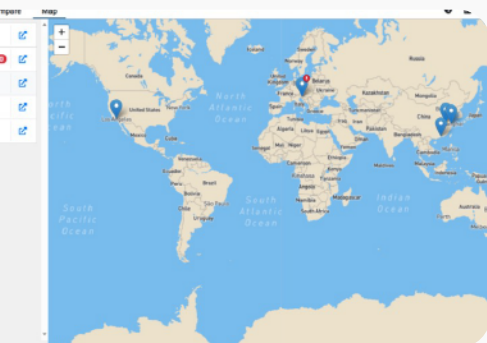


CAdEN

Aden

空压医生专家系统

Compressed Air doctor
Expert Network



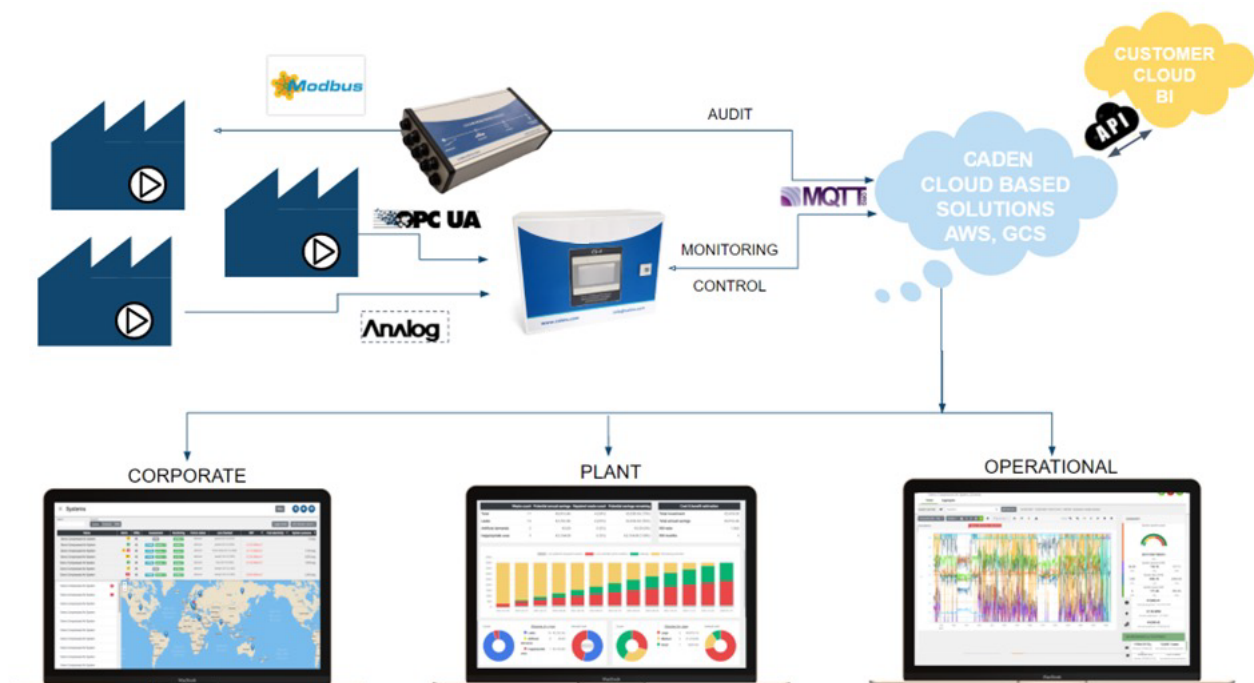
Outlines

项目概要

We look forward to working with your company and supporting your efforts to improve compressed air system efficiency and reliability with focus on complete system. Process is designed in 5 steps with first simple pre-audit and systems details, following with basic audit and selecting external expert for detail supply side focused audit where normally the big savings are located. CAdEN platform helps you set targets and methods with yearly assessments for ongoing compressed air optimisation that is independent from manufacturers. And together with training and asset management helps to establish benchmarking and continuous system improvements regardless of system changes.

我们期待与贵司合作,通过对全系统的审计和优化提高高压系统的效率和可靠性。整个流程设计为 5 个步骤:首先是预审计和系统评估,其次是基础审计,然后选择外部专家进行详细的供气端重点审计,这里通常可以发现大量的节能机会。CAdEN 平台可帮助您设定目标和方法,并进行独立于制造商的持续压缩空气优化年度评估。结合培训和资产管理共同帮助建立基准和持续的系统改进,而不受系统变化的影响。

- > Setting baseline and targets for all CA Systems in all locations in one place
在一个地方为所有地点的所有 CA 系统设置基线 and 目标
- > Compare to the best in class - benchmarking
与最佳实践进行比较——对标管理
- > Use KPIs and independent experts to verify equipment OEMs and service providers
使用 KPI 和独立专家来选择和验证设备厂家和服务提供商



CAdEN platform diagram showing multiple sites connection on single point- global control - local support
CAdEN平台支持单点管理的多个站点连接-全局数据共享-本地服务支持

Objectives

项目目标

- > Improve overall compressed air efficiency by defined KPIs – based on established CA cost
根据已建立的 CA 成本, 通过定义 KPI 来提高整体空压系统效率
- > Independent approach – will cover production-distribution and demand side audit
独立的方法 - 将涵盖压缩空气生产、分配和需求侧的审计
- > Project starts with pre-audit – feasibility study which determines audit focus and next steps
项目从预审计(可行性研究)开始, 以确定审计重点和下一步方案
- > End-user on-line training will support each step to be transparent and interactive
用户需参加在线培训, 从而保证每个步骤双方的透明和互动
- > Permanent monitoring using the online web platform, connecting independent experts, service providers, OEMs and end-user to have the same transparent measured data
使用基于浏览器访问的 CAdEN 平台实现长期持续监测, 将独立专家、服务提供商、设备制造商和最终用户连接起来, 共享测量数据
- > Standard control system based on Beckhoff sPLC with open algorithms that can be modified to connect to customer production using pressure-flow-controllers to stabilize pressure if benefits can be proven during audits and simulations. Additional Zone control system with Flow controllers CFC for each compressor room and factory with dynamic advanced zone control
标准控制系统基于 Beckhoff sPLC 与开放算法, 使用压力 - 流量控制器来稳定压力, 控制到客户产线的用气, 其效益可以在审计和仿真过程中证明。额外的区域控制系统与流量控制器 CFC 为每个压缩机站房以及工厂实现先进的动态区域控制
- > Asset management on multiple sites with KPIs base benchmarking and global control over all locations
对多个地点对标 KPI 的资产管理, 可以实现对所有地点进行全局控制

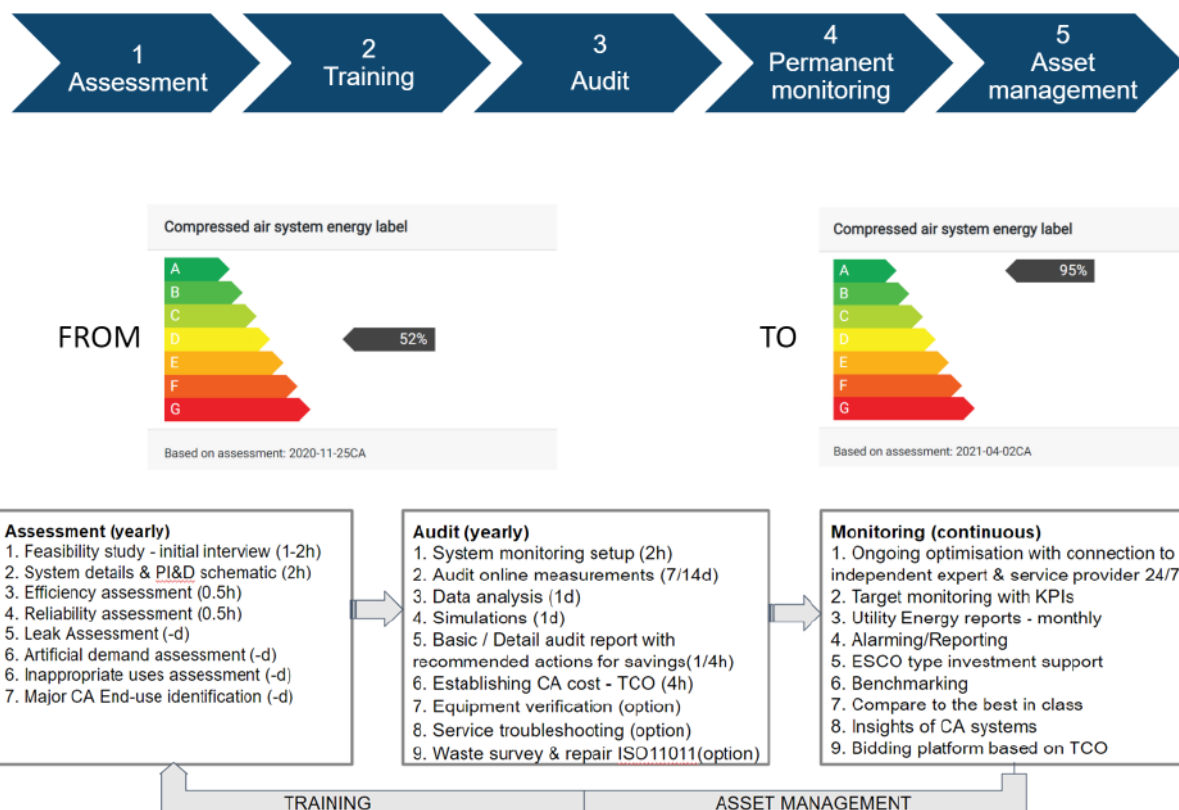
Approach

项目步骤

CAdEN audit process includes 5 steps CAdEN

项目通常包括 5 个步骤：

1. Assessment (pre-audit interview, Reliability, efficiency, Leaks, Artificial demand, Inappropriate uses, end-uses)
评估 (预审核面谈, 可靠性、效率、泄漏、假性需求、不当使用、最终用途)
2. Training (Energy managers, employees)
培训 (能源经理、员工)
3. Audit (online audits with web platform, complete system analysis and report)
审计 (web 平台在线审计, 完整的系统分析和报告)
4. Monitoring (permanent connection to the customer system for ongoing optimization with external auditor validation, based on KPIs)
监控 (与客户空压系统的永久连接, 基于 KPI 由外部专家进行验证, 从而实现持续优化)
5. Asset management (Investment monitoring, benchmarking, e-bidding)
资产管理 (投资监控, 对标管理, 电子投标)

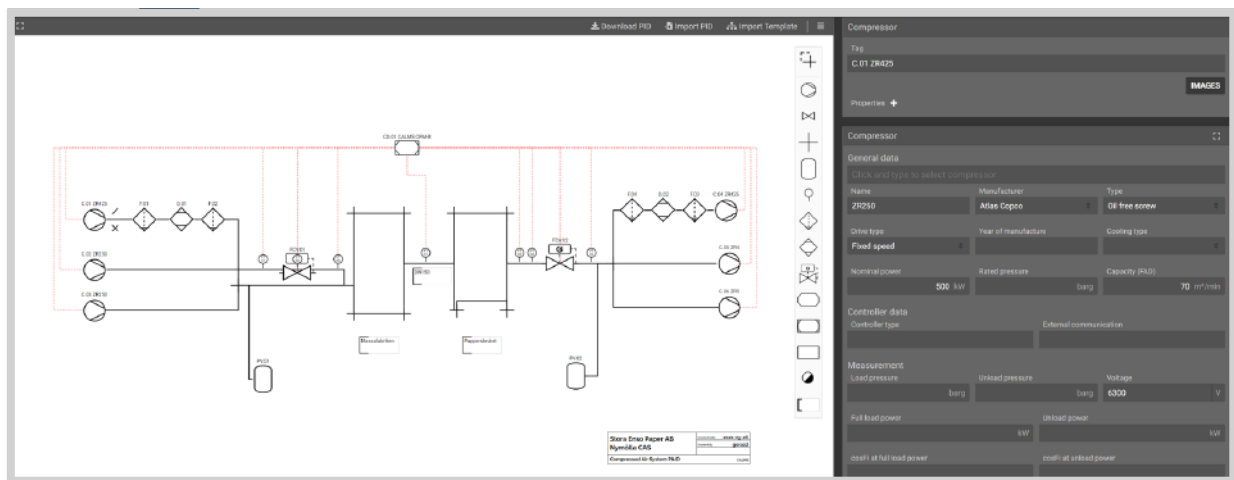


*Times for evaluation are guidelines - estimations based on an average medium system (4 compressors)
评估时间是基于中等空压系统 (4 个压缩机) 的估计

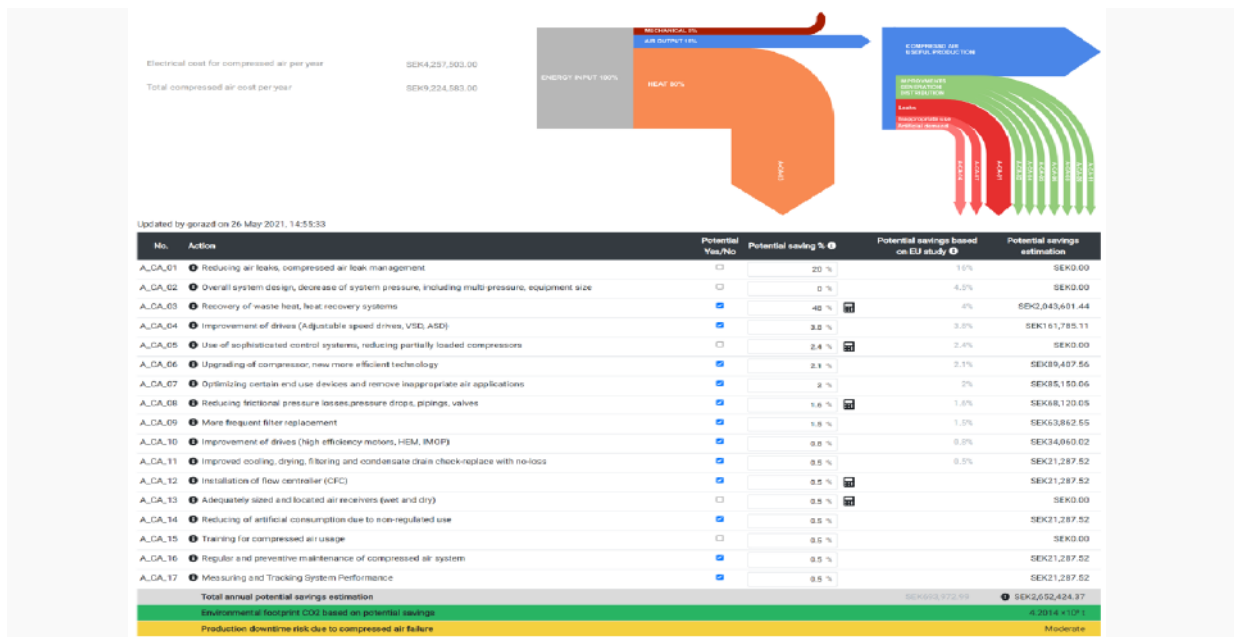
Assessment 评估

CADeN platform will guide you through the assessment process starting with pre-audit, collecting general compressed air details, creating PI&D scheme of the existing system, interview and filling efficiency and reliability scores resulting with energy consumption and potential savings estimations.

CADeN 平台将指导您完成评估过程,从预审计开始,收集空压系统的必要数据,创建当前系统的 PI&D 原理图,通过面谈填写效率和可靠性评分卡,从而得出能耗和潜在节约的评估结果。



Collecting system details and creating PI&D schematic with all measurement instrumentation
收集系统详细信息,并创建包含有测量仪表的 PI&D 原理图



The assessment result (phase 1) is potential savings estimation and energy label for existing system with efficiency and reliability score

评估结果 (阶段 1) 是对当前系统进行潜在节能估算和能源标定,并进行效率和可靠性评分

Audit 审计

Audits starts with measurements using CAdEN developed edge devices – cloud loggers for collecting data with sample rates as low as 1 sec. And has unique ability to allow user and expert to work online in real time. Cloud devices are using 3G or 4G modems for sending data through MQTT to the servers hosted on AWS with all safety protocols. The owner of data is always end-user and can export or delete all data or assign to any service provider or expert.

审计从使用 CAdEN 开发的边缘设备测量开始：用于采集采样频率低至 1 秒的数据云记录仪。允许用户和专家实时在线工作。云设备使用 3G 或 4G 网卡通过 MQTT 向托管在 AWS 上的服务器发送数据，并满足所有安全协议。数据的所有者始终是最终用户，可以导出或删除所有数据，可以分配给任何服务商或专家。



CAdEN offers detail analysis tools experts to identify savings and troubleshooting: advanced plot and graph functions, table view, histogram, Cusum, M&T diagram, correlation analysis, advanced simulations, analyzer tools..

CAdEN 平台提供专业的分析工具，以确定能源节省和故障排除：先进的绘图和图形功能，表视图，直方图，累积图，M&T 图，相关性分析，先进仿真，分析器工具...

Table 1.1 Industrial Sector Uses of Compressed Air

Industry	Example Compressed Air Uses
Apparel	Conveying, clamping, tool powering, controls and actuators, automated equipment
Automotive	Tool powering, stamping, control and actuators, forming, conveying
Chemicals	Conveying, controls and actuators
Food	Dehydration, bottling, controls and actuators, conveying, spraying coatings, cleaning, vacuum packing
Furniture	Air piston powering, tool powering, clamping, spraying, controls and actuators
General Manufacturing	Clamping, stamping, tool powering and cleaning, control and actuators
Lumber and Wood	Sawing, hoisting, clamping, pressure treatment, controls and actuators
Metals Fabrication	Assembly station powering, tool powering, controls and actuators, injection molding, spraying
Petroleum	Process gas compressing, controls and actuators
Primary Metals	Vacuum melting, controls and actuators, hoisting
Pulp and Paper	Conveying, controls and actuators
Rubber and Plastics	Tool powering, clamping, controls and actuators, forming, mold press powering, injection molding
Stone, Clay, and Glass	Conveying, blending, mixing, controls and actuators, glass blowing and molding, cooling
Textiles	Agitating liquids, clamping, conveying, automated equipment, controls and actuators, loom jet weaving, spinning, texturizing

Table 1.2 Non-Manufacturing Sector Use of Compressed Air

Sector	Example Compressed Air Uses
Agriculture	Farm equipment, materials handling, spraying of crops, dairy machines
Mining	Pneumatic tools, hoists, pumps, controls and actuators
Power Generation	Starting gas turbines, automatic control, emissions controls
Recreation	Amusement parks - air brakes
	Golf courses - seeding, fertilizing, sprinkler systems
	Hotels - elevators, sewage disposal
	Ski resorts - snow making
	Theaters - projector cleaning
	Underwater exploration - air tanks
Service Industries	Pneumatic tools, hoists, air brake systems, garment pressing machines, hospital respiration systems, climate control
Transportation	Pneumatic tools, hoists, air brake systems
Wastewater Treatment	Vacuum filters, conveying

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